

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: M. OOE, et al.
Serial No.: 10/585,738
Filed: JULY 12, 2006
For: PHOTSENSITIVE POLYMER COMPOSITION, METHOD OF
PRODUCING PATTERN AND ELECTRONIC PARTS
Group AU: 1794
Examiner: Gerard T. Higgins
Confirm. No.: 7230

REQUEST FOR RECONSIDERATION

Mail Stop: AMD – FEE

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

January 25, 2010

SIR:

In response to the Office Action mailed July 27, 2009, the period for response having been extended for three (3) months by the attached Petition for Extension of Time, Applicants respectfully submit the following Remarks, and enclosed Declaration Under 37 CFR 1.132 executed December 21, 2009, traversing the prior art rejections in Items 4, 6 and 7 on pages 2-11 of the Office Action mailed July 27, 2009.

As contended in the following, and in light of the Declaration Under 37 CFR 1.132 submitted herewith (hereinafter "Second Declaration") and the Proposed Declaration Under 37 CFR 1.132, submitted with the Amendment After Final Rejection filed July 14, 2009 (hereinafter "First Declaration"), it is respectfully submitted that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the references applied by the Examiner in rejecting claims in the Office Action mailed July 27, 2009, that is, the teachings of

U.S. Patent Application Publication No. 2003/0204117 to Matsuishi, et al., Japanese Patent Document No. 2000-305268 (Tadayuki '268), and Japanese Patent Document No. 2001-312063 (Tadayuki '063), under the provisions of 35 USC 102 and 35 USC 103.

Initially, as will be discussed infra, it is respectfully submitted that Tadayuki '268 would not have taught the presently claimed subject matter, in light of the requirements of 35 USC 102.

Moreover, even assuming, arguendo, that the teachings of references as applied by the Examiner in paragraphs 6 and 7 on pages 5-11 of the Office Action mailed July 27, 2009, would have established a prima facie case of obviousness, the evidence presently of record overcomes any such prima facie case of obviousness, and supports a conclusion of unobviousness of the presently claimed invention.

Thus, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such a photosensitive polymer composition as in the present claims, including, in addition to the recited polyamide and the compound which generates an acid upon receiving light, the compound represented by the general formula (II) in claim 1, including wherein each of the Rs of this compound represents hydrogen, and each of R¹ and R² independently represents a fluoroalkyl group having 1-3 carbon atoms, with one or two "OH" groups on each aromatic ring and with one or two "CH₂OR" also on each aromatic ring. See claim 1.

As discussed in detail infra, it is respectfully submitted that Tadayuki '268, while generically disclosing many substituents on the benzene rings, does not anticipate the substituents of the present claims within the meaning of 35 USC 102; and in view of the unexpectedly better results achieved according to the present

invention, as seen by the evidence in the submitted First and Second Declarations, unobviousness has been established.

Thus, note that while in Formula 10 of Tadayuki '268 only a single "OH" group is on each benzene ring, in the present invention that can be one or two OH groups on each benzene ring. Moreover, while in Tadayuki '268 X is a single bond or a divalent organic group, according to the present invention each of R¹ and R² independently represents a fluoroalkyl group having 1-3 carbon atoms. In view of differences between Tadayuki '268 and the present claims, with respect to the compound (c), and, moreover, noting the other formulas for the ingredient (c) of Tadayuki '268 (note, in particular, Formulas 9, 12, 13 and 14), Applicants respectfully traverse the conclusion by the Examiner that Tadayuki '268 provides a disclosure to one of ordinary skill in the art anticipating the presently claimed photosensitive polymer composition including the compound (c) in the present claims.

Moreover, as will be discussed further infra, the presently claimed subject matter, with the compound represented by the general formula (II) including each of the Rs representing hydrogen and the specific "OH" and "CH₂OH" groups, with R¹ and R² independently representing fluoroalkyl groups having 1 to 3 carbon atoms, achieves unexpectedly better results in, e.g., sensitivity as compared to corresponding compositions in Tadayuki '268 including components (a) and (b) as in the present claims, but with a different compound than that of compound (c) of the present claims. Emphasizing that the comparison in the First Declaration is a comparison with the most desirable corresponding compound as disclosed in Tadayuki '268, it is respectfully submitted that Tadayuki '268, either alone or in combination with the teachings of Matsuishi, et al. and Tadayuki '063, would have neither taught nor would have suggested the presently claimed invention, including

wherein the photosensitive polymer composition includes the compound (c) represented by the general formula (II) with R, R¹, R², m and n specified as in the present claims, and unexpectedly better results achieved thereby.

Furthermore, attention is respectfully directed to the enclosed Second Declaration for establishing unexpectedly better results. In the enclosed Second Declaration, bis(2-hydroxy-3-hydroxymethyl-5-methyl phenyl) methane is used as the compound (c). This compound is used in Example 1 of Tadayuki '268, and it is respectfully submitted that this compound is the best mode of Tadayuki '268. As can be appreciated from the first full paragraph on page 3 of the enclosed Second Declaration, the proper exposure amount using a composition with this compound used in Example 1 of Tadayuki '268 was determined to be 340 mJ/cm² by observing the obtained patterns, which means that the sensitivity was not so high. As can be appreciated from this Second Declaration, as well as from the First Declaration discussed in detail infra, it is respectfully submitted that the presently claimed subject matter including the compound (c) of the present claims achieves unexpectedly better results in sensitivity, providing a basis for a conclusion of patentability of the presently claimed subject matter.

Moreover, it is respectfully submitted that the teachings of the applied references, particularly of Tadayuki '268, describing many different materials for the component (c), would not have led one of ordinary skill in the art to the specific photosensitive polymer composition of the present claims, including the compound represented by the general formula (II) with substituents as in the present claims; and, in any event, the teachings of the applied references would have neither disclosed nor would have suggested unexpectedly better results achieved by the

presently claimed composition, including the component (c), particularly with respect to sensitivity of the composition, as discussed infra.

Furthermore, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such a method of producing a pattern, including applying the photosensitive polymer composition according to claim 1 on a support substrate, with subsequent light exposure, development and heat treatment (see claim 8); or the electronic part including an electronic device having a layer of a pattern obtained by the method according to claim 8 (see claim 10).

In addition, it is respectfully submitted that the teachings of these applied references would have neither disclosed nor would have suggested such a photosensitive polymer composition as in the present claims, having features as discussed previously in connection with claim 1, and, additionally, amounts of components in the composition as in claims 4, 12 and 13.

Moreover, it is respectfully submitted that the teachings of these applied references would have neither disclosed nor would have suggested such method of producing a pattern as in the present claims, having features as discussed previously in connection with claim 8, and, additionally, wherein the exposure light source used in the step of exposure generates i-line (see claim 9); and/or wherein the developing is performed utilizing an alkaline aqueous solution (see claim 14); and/or wherein the heat treating is performed at a temperature in a range of 150°-450°C (see claim 15).

In addition, it is respectfully submitted that the teachings of these applied references would have neither disclosed nor would have suggested such photosensitive polymer composition as in the present claims, having features as

discussed previously in connection with claim 1, and, additionally, wherein the composition further includes a compound (component (d)) which reduces solubility of the component (a) with respect to an alkali aqueous solution (note claim 5); in particular, wherein this compound which reduces solubility of the component (a) is a diaryliodonium salt represented by the general formula (III) in claim 6, or amounts of components (b)-(d) set forth in claim 7.

Again, attention is respectfully directed to the First Declaration by one of the named inventors of the above-identified application. This First Declaration reports, in Declaration form, the results of Additional Comparative Examples A and B, using materials within the scope of the ingredient (c) of Tadayuki '268, but outside the scope of compound (c) of the present claims. Note that Additional Comparative Example A of the First Declaration includes bis(2-hydroxy-3-methoxymethyl-5-methyl phenyl) methane, described as having "the high most desirable effect" for the composition of Tadayuki '268, in paragraph [0041] of Tadayuki '268. As described in Item 7 on the fifth page of this First Declaration, and from the results set forth in Item 6 bridging the fourth and fifth pages thereof, it has been shown that photosensitive polymer compositions as in the present claims, including compound (c) of the present claims, have unexpectedly higher sensitivity than corresponding photosensitive polymer compositions as in Tadayuki '268, having compounds (a) and (b) as in the present compositions, but with an ingredient (c) outside the scope thereof.

Emphasizing the Additional Comparative Examples A and B of the First Declaration, as well as the Additional Comparative Example C of the enclosed Second Declaration, it is respectfully submitted that Applicants have shown unexpectedly better results in connection with the presently claimed subject matter,

as compared with the closest prior art (which is Tadayuki '268), establishing unexpectedly better results of the present invention.

Thus, and as clearly supported by the comparative results in the First and Second Declarations, Applicants have selected a group of compounds for compound (c) which, together with compounds (a) and (b), provides unexpectedly better results in sensitivity, as compared with the teachings of Tadayuki '268, the closest prior art. Again emphasizing that Tadayuki '268 selects materials for ingredient (c) other than those of compound (c) of the present claims, as having "the most desirable effect" for ingredient (c), and uses a compound outside the scope of the present claims for compound (c) in Example 1 thereof, it is respectfully submitted that the evidence of record establishes unexpectedly better results, and therefore unobviousness, of the presently claimed subject matter.

Thus, Additional Comparative Examples A and B in the First Declaration, and the Additional Comparative Example C in the Second Declaration enclosed herewith, show unexpectedly better results achieved according to the present invention as compared with the closest prior art (Tadayuki '268).

The contentions by the Examiner on page 12 of the Office Action mailed July 27, 2009, in connection with the Declaration Under 37 CFR 1.132 filed July 14, 2009 (First Declaration), are noted. While the Examiner has referred to a fluorinated alkylidene group as the central R^1-C-R^2 moiety as the closest prior art, with "p" and "q" being equal to 0, it is respectfully submitted that such compound with the fluorinated alkylidene group as the central R^1-C-R^2 moiety and with "p" and "q" being equal to 0 falls within the scope of the present invention. It is respectfully submitted that Applicants need not compare the present invention with the present invention, in order to provide a proper comparison for establishing unexpected results. See

Manual of Patent Examining Procedure (MPEP) 716.02(e), subsection III. See In re Chapman, 148 USPQ 711 (CCPA 1966) (requiring Applicant to compare claimed invention with polymer suggested by the combination of references relied upon in the rejection of the claimed invention under 35 USC 103 “would be requiring comparison of the results of the invention with the results of the invention”). To the contrary, it is respectfully submitted that the evidence in the First and Second Declarations provide a proper and fair comparison with the closest prior art, as discussed previously.

The additional contention by the Examiner on page 12 of the Office Action mailed July 27, 2009, that the First Declaration is ineffective against the 35 USC 102(b) rejection as anticipated by Tadayuki '268, is noted. As will be discussed in detail infra, it is respectfully submitted that the anticipation rejection is clearly improper, Tadayuki '268 not disclosing the presently claimed subject matter. Thus, the issue is whether the evidence overcomes the obviousness rejections, including the obviousness rejection over the teachings of Tadayuki '268.

Tadayuki '268 discloses a photosensitive polymer composition of a positive type being formed of various combinations of materials as set forth in paragraphs [0008]-[0014] thereof. Note also paragraph [0042] of this patent document, disclosing that in general formula (II), as a divalent basis shown by X, a carbon number of a methylene group, ethylene group, propylene group, etc., is used. This patent document also discloses that some or all of the hydrogen atoms of the hydrocarbon groups can be replaced with halogen atoms, such as a fluorine atom, in connection with Formula 18.

It is respectfully submitted that Tadayuki '268 does not disclose, that is, would not have guided one of ordinary skill in the art to, the composition as in the present claims, including the compound (c) wherein each of m and n represents

independently an integer of 1 or 2, each of the Rs represents hydrogen, and each of R¹ and R² independently represents a fluoroalkyl group having 1-3 carbon atoms.

The contention by the Examiner on page 3 of the Office Action mailed July 27, 2009, that the "Examiner" clearly envisages [Tadayuki '268] at least disclosing a 1,1,1,3,3,3-hexafluoropropyl group", is noted. It is respectfully submitted that the issue is not what the Examiner sees, but rather what one of ordinary skill in the art would understand that the reference (Tadayuki '268) teaches. In view of the many compounds for the ingredient (c) as in Tadayuki '268, including those within each of Formulas II-IV, it is respectfully submitted that Tadayuki '268 does not sufficiently guide one of ordinary skill in the art to a composition with components (a) and (b) and with the component (c) as in the present claims, so as to constitute an anticipation of the presently claimed subject matter.

In connection with the obviousness rejection over the teachings of Tadayuki '268, in Item 6 on pages 5-7 of the Office Action mailed July 27, 2009, it is respectfully submitted that any prima facie case of obviousness over the teachings of this reference is overcome by the evidence of record, discussed previously.

Tadayuki '063 discloses a positive-type, heat-resistant photosensitive polymer composition that, when thermally treated, becomes a polybenzoxazole-type heat-resistant polymer that is suitable as the passivation films, interlayer insulating films and so forth, of electronic components. The composition includes (i) a specific polyamide having a repeating unit expressed by General Formula I on page 8 of the English translation of this patent document, (ii) a compound that generates an acid when exposed to light, and (iii) a compound having alkoxymethyl groups and phenolic hydroxyl groups in the molecule. Note General Formula II on page 9 of the English translation of Tadayuki '063, wherein X represents a single bond or divalent

organic group; Rs individually represent an alkyl group or alkynyl group; R¹ and R² individually represent an alkyl group or alkynyl group; m and n are individually one or two; and p and q are individually an integer of from 0-3. Note the further disclosure in this patent document that X is a group expressed by the Chemical Formula 7 in paragraph [0010] of this patent document, wherein the two A's individually represent a hydrogen atom or an alkyl group having 1-10 carbon atoms.

It is respectfully submitted that this patent document does not disclose, nor would have suggested, such composition as in the present claims, including the component (c) wherein, inter alia, each of R¹ and R² independently represents a fluoroalkyl group having 1-3 carbon atoms.

It is respectfully submitted that the additional teachings of Matsuishi, et al. and of Tadayuki '268 would not have rectified the deficiencies of Tadayuki '063, such that the presently claimed invention as a whole would have been obvious to one of ordinary skill in the art.

Matsuishi, et al. discloses hydroxymethyl-substituted polyfunctional phenols, having the general structure (I) as in paragraph [0009] on page 1 of this patent document. Note that X of the general structure (I) can be a bivalent group (c) represented by the General Structure (IV) in paragraph [0017] on page 1 of this patent document, wherein R₇ and R₈ each independently represent a hydrogen atom or a monofluoromethyl, difluoromethyl or trifluoromethyl group, but R₇ and R₈ cannot both be hydrogen atoms. See also paragraphs [0026] and [0027] on page 2 of this patent document. This patent document discloses that the compounds can be used as a photo-resist material or to derive polyphenol compounds through further reaction with phenolic compounds, or as a compounding agent that adds to the

molecular weight of novolac phenol resins or as hardening agents for epoxy resins of specified uses. See paragraph [0044] on page 4 of this patent document.

Tadayuki '268 has been previously discussed.

Emphasizing that Matsuishi, et al. is directed to a different technology than that of Tadayuki '268 and Tadayuki '063 (being directed to polyfunctional phenols, in contrast to photosensitive resin compositions) and addresses different problems (providing polyfunctional phenols with heat resistance and other properties such as water repellency, in contrast to providing positive photosensitive compositions), it is respectfully submitted that one of ordinary skill in the art involved in the Tadayuki references would not have looked to the teachings of Matsuishi, et al. In other words, these references are directed to non-analogous arts.

Moreover, it is respectfully submitted that one of ordinary skill in the art involved in connection with the present invention, noting the objectives thereof, would not have looked to the teachings of Matsuishi, et al., providing property-modifying effects for polyfunctional phenols, for achieving such objectives.

In addition, noting the above-discussed differences between the teachings of Matsuishi, et al., on the one hand, and of the Tadayuki, et al. references on the other, it is respectfully submitted that the Examiner has provided no proper reason for combining teachings of these references, absent hindsight use of Applicants' disclosure. Of course, such hindsight use is improper under the requirements of 35 USC 103.

Again, the unexpectedly better results shown by the evidence of record, that is, the aforementioned First and Second Declarations, are noted. It is respectfully submitted that the evidence of record shows unexpectedly better results as compared to the teachings of each of Tadayuki '063 and Tadayuki '268, overcoming

any possible prima facie case of obviousness established by the combined teachings of Tadayuki '063, Matsuishi, et al. and Tadayuki '268.

On page 13 of the Office Action mailed July 27, 2009, the Examiner contends that given the explicit disclosure of Tadayuki '063, "the Examiner" clearly sees the 1,1,1,3,3,3-hexafluoropropane central group at least from [0038] of Tadayuki '063. However, it must be emphasized that the Examiner has not rejected the present claims as anticipated by the teachings of Tadayuki '063. Accordingly, such comments by the Examiner in connection with Tadayuki '063 are not understood.

It is respectfully submitted that the evidence of record shows unexpectedly better results achieved by the presently claimed invention having, inter alia, as the compound c, a compound represented by the general formula (II) wherein each of the Rs represents hydrogen, and each of R¹ and R² independently represents a fluoroalkyl group having 1-3 carbon atoms. It is respectfully submitted that the teachings of the applied references, including Tadayuki '268 and Tadayuki '063, would have neither disclosed nor would have suggested the unexpectedly better results in sensitivity as achieved by the presently claimed composition, including, in addition to the components (a) and (b), the compound represented by the general formula (II) wherein each of the Rs represents hydrogen and each of R¹ and R² independently represents a fluoroalkyl group having 1-3 carbon atoms.

In view of the foregoing comments, and further in view of the enclosed Second Declaration and the evidence in the previously submitted First Declaration, reconsideration and allowance of all claims presently pending in the above-identified application are respectfully requested.

Applicants request any shortage in fees due in connection with the filing of this paper be charged to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP,

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Deposit Account No. 01-2135 (case 1270.46327X00), and credit any excess
payment of fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

By /William I. Solomon/
William I. Solomon
Registration No. 28,565

Enclosures: Declaration Under 37 CFR 1.132 (M. Ooe, 4 pp., dated December 21,
2009, Second Declaration)

WIS/ksh
1300 17th Street N., Suite 1800
Arlington, Virginia 22209
Tel: 703-312-6600
Fax: 703-312-6666